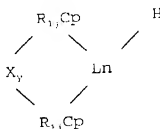


Amend

CLAIMS

1. A method of preparing block copolymers, comprising the steps of polymerizing a first monomer consisting of an alpha-olefin containing from 3 to 20 carbon atoms into a first, isotactic block, using a catalyst, then polymerizing at least one second monomer, said catalyst being in the form of a hydride complex of a trivalent metal from the rare earth group, having the formula I:



in which:

- Cp is a cyclopentadienyl radical;
R₁, identical or different at each occurrence, is a substituent of the cyclopentadienyl group and is an alkyl radical or a silicon-containing hydrocarbon radical, unsubstituted and containing from 1 to 6 carbon atoms;
j, identical or different at each occurrence, is 1, 2 or 3;
X is a divalent alkylene radical containing from 1 to 20 carbon atoms or Si(R)₂ in which R is an alkyl radical having from 1 to 4 carbon atoms;
y is 1 or 2;
Ln is Y or Sm.
2. The method as claimed in claim 1, wherein, in the formula I, R₁Cp is the group 2-Me₃Si, 4-Me₂tBuSiCp or the group 2-Me₃Si, 4-tBuCp.
3. The method as claimed in claim 1 or 2, wherein the catalyst is Me₂Si(2-Me₃Si, 4-Me₂tBuSiCp)₂YH or Me₂Si(2-Me₃Si, 4-tBuCp)₂SmH.

4. The method as claimed in one of claims 1 to 3, wherein the catalyst is racemic.
5. The method as claimed in one of claims 1 to 4, wherein the catalyst is generated in situ in the presence of at least one portion of the first monomer.
6. The method as claimed in one of claims 1 to 5, wherein the catalyst is prepared by hydrogenation of the alkyl precursor.
- 10 7. The method as claimed in one of claims 1 to 6, wherein the blocks are homopolymers or random copolymers.
8. The method as claimed in one of claims 1 to 7, wherein the block copolymer comprises a block of the second monomer which is a vinyl, vinylidene or lactone compound.
- 15 9. The method as claimed in claim 8, wherein the vinyl or vinylidene compound is represented by the formula $H_2C=CR'Z$ in which R' is hydrogen or an alkyl radical having from 1 to 12 carbon atoms and Z is an electron-withdrawing radical.
- 20 10. The method as claimed in claim 9, wherein the vinyl or vinylidene compound is an ester of an unsaturated carboxylic acid.
11. The method as claimed in one of claims 8 to 10, wherein the poly-alpha-olefin is crystalline.
- 25 12. The method as claimed in one of claims 1 to 11, wherein the second monomer is polar.
13. The method as claimed in one of claims 1 to 12, for preparing a poly-alpha-olefin/PMMA or poly-alpha-olefin/polylactone copolymer.
- 30 14. The method as claimed in one of claims 1 to 10, wherein the block copolymer comprises a block of the second monomer which is an alpha-olefin.
15. The method as claimed in claim 14, wherein the first poly-alpha-olefin is crystalline and the second poly-alpha-olefin is crystalline.
- 35 16. The method as claimed in claim 15, for preparing a PP/PE copolymer.

17. The method as claimed in claim 13, wherein the first poly-alpha-olefin is crystalline and the second poly-alpha-olefin is amorphous.
18. The method as claimed in claim 17, for preparing a PP/EP copolymer.
19. The method as claimed in one of claims 1 to 18, wherein the block copolymer comprises a first iPP block.
20. A copolymer comprising a first block of a crystalline polyolefin derived from an alpha-olefin containing from 3 to 20 carbon atoms and a second block of an amorphous polyolefin, with the exception of a PP/EP copolymer having a molecular mass Mn of less than or equal to 16 000 and a polydispersity index of between 3 and 3.3.
21. The copolymer as claimed in claim 20, which is a PP/EP copolymer.
22. A copolymer comprising a first block of a crystalline polyolefin derived from an alpha-olefin containing from 3 to 20 carbon atoms and a second block of a crystalline polyolefin.
23. The copolymer as claimed in one of claims 20 to 22, wherein the first block is isotactic.
24. A copolymer comprising a first block of an amorphous polyolefin derived from an alpha-olefin containing from 3 to 20 carbon atoms and a second block of an amorphous polyolefin.
25. The copolymer as claimed in one of claims 20 to 24, wherein the blocks are homopolymers or random copolymers.

1200 A₁ >